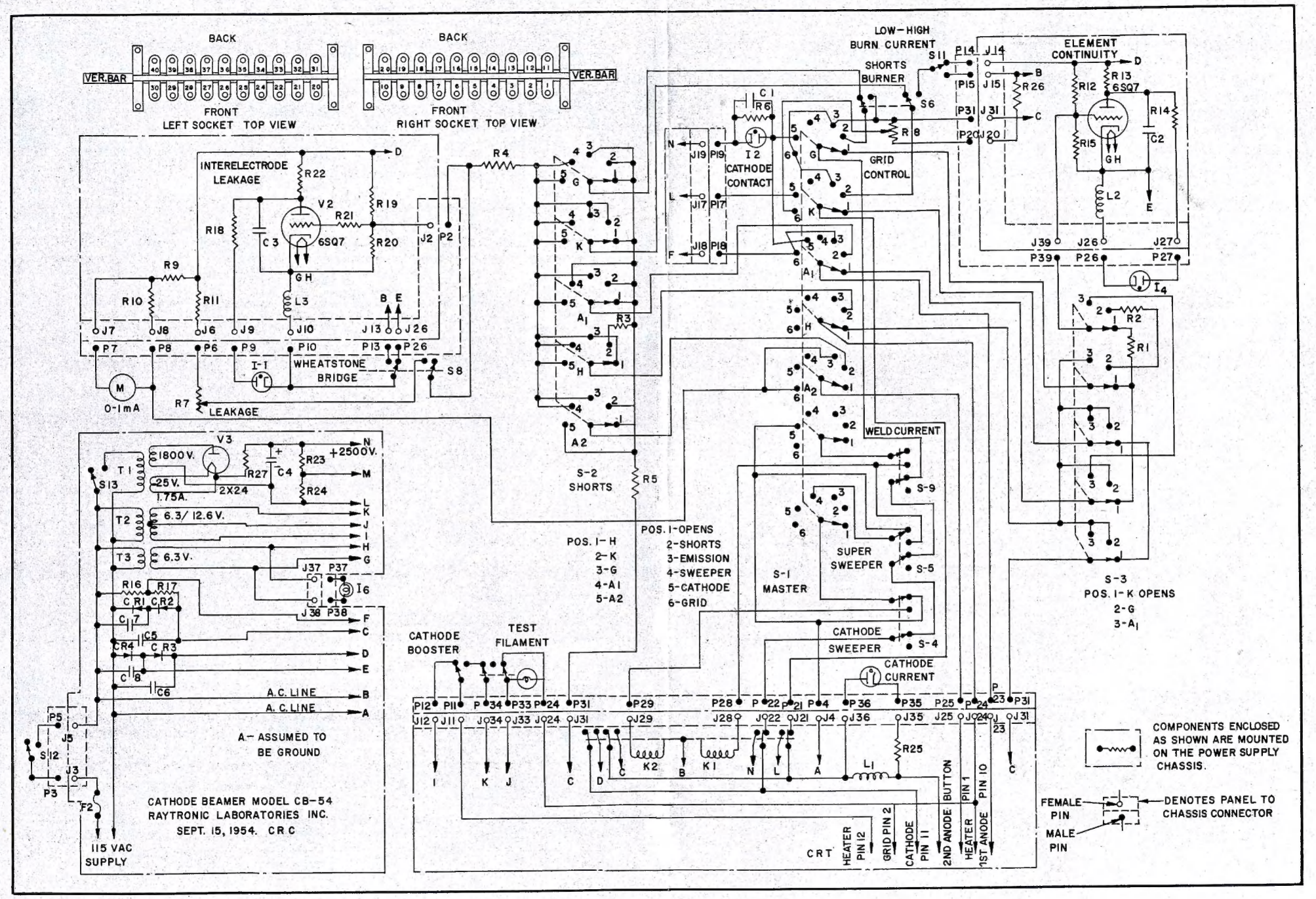

BACK
VER.BAR
FRONT
LEFT SOCKET TOP VIEW
BACK
VER.BAR
FRONT
RIGHT SOCKET TOP VIEW
INTERELECTRODE LEAKAGE
R22
V2
R21
R19
R18
C3
6SQ7
R20
R9
R10
R11
L3
J7
J8
J6
J9
J10
J13
J26
P7
P8
P6
P9
P10
P13
P26
J2
P2
D
B E
GH
I-1
WHEATSTONE BRIDGE
S8
M
0-1mA
R7
LEAKAGE
R4
R3
R5
A1
A2
S-2 SHORTS
POS. 1-OPENS
2-SHORTS
3-EMISSION
4-SWEEPER
5-CATHODE
6-GRID
POS. 1-H
2-K
3-G
4-A1
5-A2
LOW-HIGH BURN CURRENT
S11
SHORTS BURNER
S6
C1
R6
I2
CATHODE CONTACT
R8
GRID CONTROL
J19
P19
J17
P17
J18
P18
N
L
F
P14
J14
P15
J15
P31
J31
P20
J20
R26
B
C
ELEMENT CONTINUITY
D
R13
6SQ7
R12
R15
R14
C2
L2
E
J39
J26
J27
P39
P26
P27
I4
R2
R1
S-3
POS. 1-K OPENS
2-G
3-A1
WELD CURRENT
S-9
SUPER SWEEPER
S-5
S-1 MASTER
CATHODE SWEEPER
S-4
CATHODE CURRENT
V3
T1
S13
1800 V.
25 V.
1.75A.
2X24
R27
C4
R23
+2500V.
R24
N
M
T2
6.3/12.6V.
T3
6.3V.
L
K
J
I
H
G
J37
P37
I6
J38
P38
R16
R17
CR1
CR2
C7
C5
CR4
CR3
C8
C6
F
C
D
E
A.C. LINE
A. C. LINE
B
A
P5
J5
S12
J3
P3
F2
115 VAC SUPPLY
A- ASSUMED TO BE GROUND
CATHODE BEAMER MODEL CB-54
RAYTRONIC LABORATORIES INC.
SEPT. 15, 1954. CR C
CATHODE BOOSTER
TEST FILAMENT
P12
P11
P
P34
P33
P24
P31
P29
P28
P22
P21
P4
P36
P35
P25
P24
P23
P31
J12
J11
J
J34
J33
J24
J31
J29
J28
J22
J21
J4
J36
J35
J25
J24
J23
J31
I
K
J
C
D
C
K2
B
K1
N
L
A
L1
R25
C
CRT
HEATER PIN 12
GRID PIN 2
CATHODE PIN 11
2ND ANODE BUTTON
HEATER PIN 1
1ST ANODE PIN 10
COMPONENTS ENCLOSED AS SHOWN ARE MOUNTED ON THE POWER SUPPLY CHASSIS.
FEMALE PIN
MALE PIN
DENOTES PANEL TO CHASSIS CONNECTOR

Troubleshooting Your Cathode Beamer

Listed below are the troubles you should look for in case of difficulty with your Cathode Beamer. Before looking for trouble in the unit, test the Cathode Beamer with a CR tube you know to be good. Do Not check a Good Tube for Sweeper or Cathode Weld Function.

Before disconnecting the two large plugs that connect the panel to the chassis, make certain that the plugs have been pushed all the way down, as far as they will go. Improper contacts of these plugs with their sockets can cause difficulty in any of the test or repair procedures.

Trouble Encountered	Possible Causes
Filament not lighting on CRT	1-Check for dirty or open contacts on Cathode Booster Switch (S-10). Switches S-10 and S-7 are wired so that they cannot be operated together. Thus dirty or open contacts on one will prevent the other from working. 2-Check for broken or loose wires on connecting plugs between front panel and chassis 3-Check filament transformer (T-2) for loose wires or open windings.
Low Emission or No Emission	1-Check voltage quadrupler circuit for proper operation. To check, connect a VTVM between pin 2 of the CRT socket and the second anode clip. The clip should be 600 volts or higher positive with respect to pin 2. The Master Switch should be on "Emission" for this test. If the voltage is low, test the condensers in the quadrupler circuit and replace as necessary. 2-If voltage as outlined in step 1 is OK, check contacts on large relay (K-1) for dirty or open contacts. 3- Check second anode lead. Make certain clip is making contact with CRT.
No grid control	1- Check contacts on large relay (K-1) for open or dirty contacts. 2- Check as above for low emission.
Opens Light Remains On at all times, or operates erratically.	1- Check 6SQ7 on corner of chassis (6SF5 in some units) 2- Check circuit components associated with this tube 3- Replace NE-51 Note: If CRT under test has an open cathode, the "Opens" light will not operate in any position. 4- Check contacts on large relay (K-1) for dirty or open contacts.
Shorts light on at all times or not working properly Wheatstone Bridge Not Reading Correctly	1- Check the 6SQ7 in center of chassis (6SF5 in some units) 2- Check circuit components of this tube 3- Replace NE-51 4- Check relay contacts of large relay (K-1) 5- Check all push button switches on panel for proper operation
K-G Shorts Burner Not Operating Properly	1-Check DC Voltages as described under causes of low emission, above. 2-Check K-G Shorts Burner Push Button Switch Contacts 3-Check Low and High Positions on Burn Current Switch 4-Check both Sweeper Buttons and Cathode Weld Button for Open Contacts
Cathode Sweeper Not Operating	1-If relay does not operate when button is pushed, check the contacts on Cathode and Super Sweeper Buttons 2-If relay operates, but sweeper action is not right, check voltages, as specified under causes of low emission, above. 3-If voltages check OK, connect a DC volt meter to pins 2 and 11 of CRT Socket. Push Cathode Sweeper Button. Pin 2 should be 600 volts positive with respect to pin 11. If this voltage is incorrect, check the 1 millihenry chokes in parallel or single 2 millihenry choke (l-1). Replace chokes if they are open or burned. 4-Check contacts on both large and small relays for dirty or open condition
Super Sweeper Not Operating Properly	1-If relay does not operate when Super Sweeper Button is pushed, turn Master Selector Switch to Cathode and push Cathode Weld Button. If relay operates in this position, check contacts on the Super Sweeper and Cathode Sweeper Buttons. If relay does not operate, check conductors leading to relay and relay coil. 2-If Super Sweeper does not heat the tube elements as it should, make the following rough check for high voltage: Set the Master Selector Switch to Cathode. Connect a good CRT to the Cathode Beamer CRT Socket. Connect second anode lead to tube. If cathode contact light operates normally, you have high voltage. 3-Replace 2X2A tube. 4-Check the chokes as in step 3 under Cathode Sweeper troubles, above. 5-Make sure the High Voltage Switch (S-13) on the back of the chassis is On.
Cathode Weld Not Operating	1-Replace 2X2A Rectifier 2-Replace NE-51 Cathode Contact Lamp 3-If relay does not operate, check for dirty or open contacts on Cathode Weld Button 4-Check Contacts on large relay (K-1) 5-Make certain that High Voltage Switch on Chassis (S-13) is turned on. 6-Check high voltage as described in step 2 under Super Sweeper troubles, above. 7-Check the Choke or Paralleled chokes (L-1)
Cathode Contact Light Does Not Light	1-Replace the NE-51 lamp 2-Replace high voltage rectifier 2X2A 3-Check resistance across Cathode Contact Light to make certain the .01 condenser is not shorted. Resistance reading should be approximately 4.7 megohms.
Smoking	1-Smoking in the unit is almost always caused by improper use of the K-G Short Burner or the Sweeper causing the choke or paralleled chokes (L-1) to smoke or burn out. These controls should not be held down more than 10 or 15 seconds.
Arcing	1-Check the leads on the Large Relay (K-1) moving contacts. Make sure there is ample clearance between leads and relay coil, or bwteen the leads to the moving contacts and the stationary contacts. 2-Check the tie points on the terminal boards under the 2X2A socket for solder shorting to chassis or being too close to chassis. 3-Check the leads on the small relay, and make certain they are well apart. 4-Check the contacts on the relays to make sure they hit at the same time.

Cathode Beamer Parts List

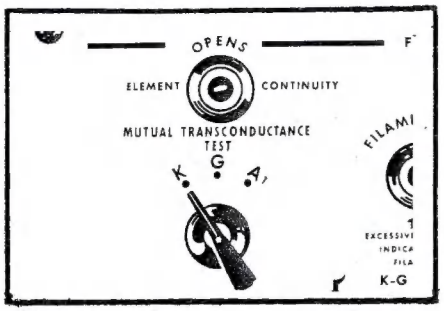
Symbol	Part #	Quan.	Description
	RESISTORS		
R-7	70045	1	10 meg variable, linear taper.
R-8	70046	1	100K variable linear taper
R-27	70047	1	50K, 10W vitreous wire wound
R-1, 6, 24	70048	3	4.7 meg, 1/2 watt
R-11, 21	70049	2	100K, 1/2 watt
R-2, 3, 14, 18	70050	4	1 meg, 1/2 watt
R-19	70051	1	3.3 meg, 1/2 watt
R-12	70052	1	10 meg, 1/2 watt
R-13, 22, 25	70053	3	560K, 1 watt
R-4, 5	70054	2	33K, 1 watt
R-15, 20	70055	2	1 meg, 1 watt
R-23	70056	1	20 meg, 1 watt
R-16	70057	1	100K, 1 watt
R-17	70058	1	47K, 1 watt
R-10	70059	1	5.6K, 1 watt
R-26	70060	1	82K, 1 watt
R-9	70061	1	220K, 1 watt
	CONDENSERS		
C-1, 2, 3	70041	3	.01, 600 VDC molded
C-5, 6, 7, 8	70040	4	30 mfd, 450 VDC tub. electrolytic
C-4	70039	1	1.0 mfd 3600 VDC oil filled
	CHOKES		
L-1	70042	1	10 millihenry 1 amp. RF Choke
L-2, 3	70044	2	10 microhenry

Symbol	Part #	Quan.	Description
	TRANSFORMERS		
T-1	70001	1	Prim: 117 V, 60 C Sec: 1800V RMS Fil: 2.5V, 1.75 A
T-2	70005	1	Prim: 117 V, 60 C Sec:12.6VCT, 1.2A
T-3	70006	1	Prim: 117 V, 60 C Sec: 6.3 V, 1.2A
	RECTIFIERS		
CR-1, 2, 3, 4	70100	4	300 mil, 130 V diode rectifier
	PANEL LIGHTS		
I-1, 2, 3, 4	70085	4	NE-51 Neon Lamp
(Sockets have built-in 180K, 1/4 W resistor)			
I-5	70086	1	#43 pilot lamp
I-6	70087	1	#47 pilot lamp
	TUBES		
V-1, 2	70073	2	6SQ7
V-3	70074	1	2X2A
	MISCELLANEOUS		
M	70003	1	0-1 mil DC meter
F-2	70081	1	3AG8 slo-blo fuse
K-2	70038	1	Relay DPDT, 5A 117 VAC coil
K-1	70037	1	Relay DPDT 10A 117 VAC coil

SWITCHES

Symbol	Part #	Quan.	Function	Description
S-1	70036	1	Master Selector	5 gang, 2 ckt per gang, non-shorting
S-2	70035	1	Shorts Selector	5 gang, 1 ckt per gang, non-shorting
S-3	70034	1	Opens Selector	3 gang, 2 ckt per gang, non-shorting
S-4	70032	1	Cathode Sweeper	DPDT, break 2, make 2, spring return
S-5	70032	1	Super Sweeper	DPDT, break 2, make 2, spring return
S-6	70032	1	KG Shorts Burner	DPDT, break 2, make 2, spring return
S-7	70031	1	Test Filament	DPDT, break 2, spring return Push Button
S-8	70033	1	Wheatstone Bridge	DPDT, break 2, make 2, lock-in push button
S-9	70032	1	Weld Current	DPDT, break 2, make 2, spring return PB
S-10	70030	1	Cathode Booster	SPDT break 1, make 1, spring return PB
S-11	70028	1	Low-High Burn	SPDT bat toggle 1A-250V, 3A-125V, AC
S-12	70029	1	Line Switch	SPST Push button lock, 3A-250V, 6A-125 V AC
S-13	70027	1	HV Safety Switch	SPST ball toggle, 3A-250V AC.

Element Continuity



Turn Master Selector to: OPENS

Be sure tube has had ample time to warm up – two or three minutes for a slow heater. Turn OPENS Selector Switch through its three positions: Cathode (K), Control Grid (G), and First Anode (A_1). Light above switch should light on all three positions. If light glows very dimly, or fails to light in the A_1 position, this may only indicate weak emission. If Cathode is open, lamp may not light on any position. To check, test for emission as explained on page 12. If cathode and grid are intact and meter reads at least 100 microamperes during emission test, then repeat Opens test for 1st Anode. If light still fails to glow, the 1st Anode is open. This condition is rarely encountered.

An intermittent 1st Anode will cause lamp to flicker or, on Emission Test, will cause meter needle to dance. Tapping on the neck of the tube during these tests will help show intermittents.

To Test 2nd Anode: There must be enough emission to light the neon lamp during the 1st Anode continuity test.

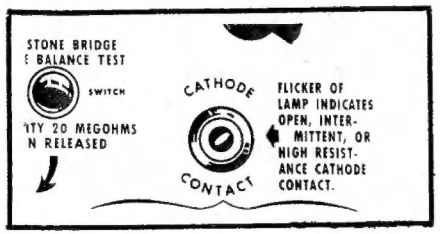
Turn Master Selector to EMISSION. If the meter fails to register even the slightest amount of emission, the final anode is open. This is a rare condition found occassionally in glass tubes when the inner aquadag coating falls away from the cavity connector button.

REPAIRS:

Open Cathode, see page 15.
Open Grid: Try soldering pin number 2.
Open or Intermittent 1st Anode: Try soldering pin number 10.
Open Second Anode: Be sure 2nd Anode test lead is clipped correctly to tube. An actual open cannot be repaired.

IMPORTANT: If in the above continuity tests, the grid should light the neon lamp considerably brighter than the cathode, or if the continuity lamp fails to light on any position procede with the following CATHODE CONTACT TEST.

Cathode Contact



Turn Master Selector to: CATHODE

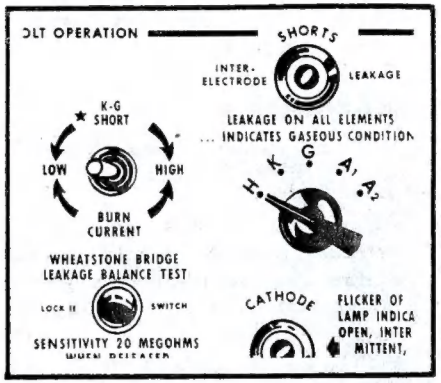
If Cathode is intact there will be a steady glow of the neon lamp labeled CATHODE CONTACT. Now tap on neck of tube. If there is any flicker of the lamp or change in brilliance, the weld between the cathode and its lead wire called the cathode Tab, is either open, intermittent, or has formed a high resistance contact. It could also be open in pin number 11. However, most open cathodes are found to be inside the tube.

If neon lamp will not light at all, repeat the ELEMENT CONTINUITY TEST on the cathode as a double check. If this test also reveals an "open", the weld inside the tube is probably broken. This can be checked visually by looking into the neck of the tube at the wire connecting pin number 11 to the cathode. When repeating the Element Continuity Test, depress the Cathode Booster. This will increase filament emission and allow conduction to the Grid and 1st Anode.

REPAIRS:

For an open or intermittent cathode, see page 15 . Also try soldering pin number 11.

Testing for Shorts Between Elements



Turn Master Switch to: SHORTS

Be sure WHEATSTONE BRIDGE Lock-In Switch is in its "out" position.

Each element is individually tested for leakage to any other element by a special Shorts Detector Circuit with a sensitivity of 20 megohms.

Turn SHORTS Selector Switch through its five positions – Heater (H), Cathode (K), Grid (G), 1st Anode (A_1) and 2nd Anode (A_2). If shorts lamp does not glow on any position, there are no shorts. If lamp glows on one position, it will, in most cases, also glow on another position since at least two elements are involved in a short. In rare cases the lamp will light only on one position because of the high value of the short.

Sometime multiple shorts will be detected, indicating three or more elements shorted together. If the lamp glows on all five positions this is usually an indication of high gas content rather than an actual short. In such cases, the gas conducts, causing the neon lamp to light. This can be checked by making the GAS test as explained on page

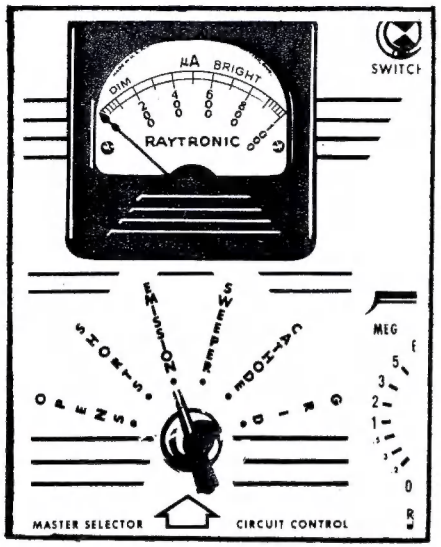
To Measure the Value of a Short – Depress the WHEATSTONE BRIDGE Lock-In Switch. Turn the SHORTS selector to one of the positions where a short was noted. Now slowly turn the LEAKAGE RESISTANCE Potentiometer to the point at which the shorts lamp is just extinguished. At this point the value of the leakage will be indicated by the pointer of the Leakage Potentiometer. If the lamp cannot be extinguished in this manner, the elements involved have a direct short.

In measuring cathode-to-heater shorts (K-H), add one megohm to the indicated value to compensate for the protective 1 meg. resistor which is incorporated in the circuit to prevent false readings caused by heater emission.

REPAIRS:

Cathode-Grid Shorts, see page 14
Other inter-element shorts see page 15 .

Emission Tests



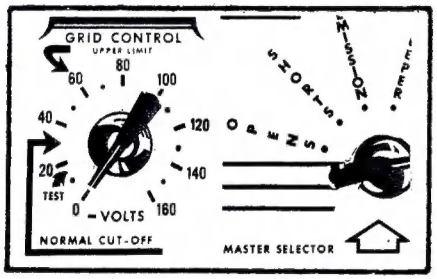
Turn Master Selector to: EMISSION

Make sure second anode lead is connected to tube, and ion trap is placed anywhere on the neck of the tube. Read emission directly on the meter in microamperes. A reading of 400 or better will usually provide a sufficiently bright picture. If a tube reads 400 or better do not attempt to increase emission further. New tubes give a reading of 600 microamperes or better. If there is any fluctuation of the needle, check for intermittent, open, or shorted elements.

REPAIRS:

For weak emission see page 13

Grid Control Test



Set Master Selector to: GRID

The Grid Control Test gives you an idea what to expect from the tube as to Contrast, Picture Quality and Brightness. You can also use the test to plot emission versus grid cut-off curves for checking differences between various tubes.

To measure the grid cut-off, turn GRID CONTROL to zero. Meter will now read emission just as it did during the regular Emission test. Now, turn the GRID CONTROL slowly toward maximum. Emission should start to fall off. At the point marked NORMAL CUT-OFF the reading on the meter should be zero. At this point the grid is minus 30 volts with respect to the cathode. However, a tube may still operate satisfactorily with a grid cut-off as high as minus 60 volts. This point is marked UPPER CUTOFF LIMIT. If a tube fails to cut off beyond this point it is usually an indication of Cathode to Grid Short, Gassy Tube, Floating Grid, Cathode Too Close to Grid, or Grid Aperture being too large.

Knock Test: At the point marked TEST on the GRID CONTROL, the pointer should be placed for the Knock Test. Observe beam current on the meter at this point. Now rap on neck of tube with a wood or plastic screwdriver handle or similar non-metallic object. If beam current falls to zero, cathode is open. If beam current jumps to maximum, cathode to grid short is present, or tube is excessively gassy.

REPAIRS:

Open Cathode, see page 15
Shorted Grid, see page 14.
Gassy Tube – Not Repairable

Preparing the Unit for Use

The Cathode Beamer is designed for use on 110-120 volt 60 cycle AC only. *DO NOT USE ON ANY OTHER TYPE OF CURRENT.*

1. Plug the unit into a source of the correct current. Push the *LINE SWITCH* button, located to the right of the test meter. The *POWER ON* green light above the meter will glow, indicating the instrument is turned on. Allow about one minute for warm-up.

CAUTION: In order to do an effective job, your Cathode Beamer employs high voltages – as high as 2500 volts on some procedures. Therefore, handle all leads carefully to prevent accidental shocks.

2. Before testing a tube, be sure the WHEATSTONE BRIDGE Lock-in Switch to the right of the test meter is in its "out" position.

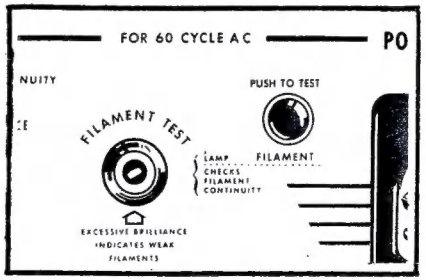
3. *Place the ion trap anywhere on the neck of the tube, and leave it there through-out all test and repair procedures.*

4. Attach the Cathode Beamer socket to the tube, and the second anode clip to the point where the high voltage lead in the set is normally attached. If the basing is unconventional, use the socket adapter with the leads connected as follows:

Pin Number of Adapter	Lead Color	Connect To
1 & 12	Black & Brown	Heater
2	Green	Control Grid
6	White	Grid 4
10	Red	1st Anode
11	Yellow	Cathode

Testing Kinescopes with Your Cathode Beamer

Filament Continuity



Set Master Switch to Any position. Push button marked PUSH TO TEST FILAMENT. Normal filament will cause lamp labeled FILAMENT TEST to light. A weak or shorted filament will cause excessive brilliance. If filament is open, lamp will not light, and examination of tube will show that filament is not lighted. A few trials will indicate the correct brilliance for a normal tube.

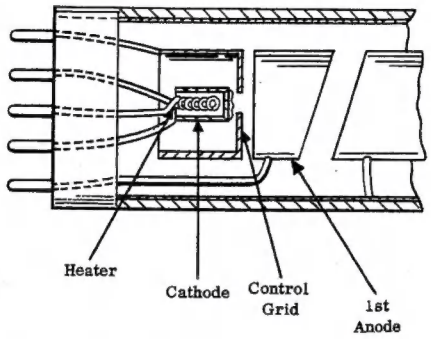
REPAIRS: Open, weak or shorted filaments cannot be repaired. Replace tube.

Things You Should Know About Kinescopes

The more you know about kinescope construction, the better you will understand the use of the Cathode Beamer. The information contained here is necessarily brief, but any standard TV text or oscilloscope manual will provide you with the necessary background on CR tube construction.

The Cathode Beamer will test both electrostatic and magnetic focus tubes. Pin number 6 of the tube socket is for the focusing grid of low voltage focus tubes. Even tubes with unconventional basing may be tested by the use of the auxiliary socket adapter.

The Electron Gun



The Electron Gun is the heart of any kinescope. Its function is to provide and control a stream of electrons, and, with the aid of external magnets plus the final anode, to direct and accelerate that stream in such a way to cause scanning lines to appear on the face of the tube.

At the base of the gun is a heater, located inside a tubular cathode. The normal placement of the heater is quite close to the cylinder wall of the cathode, and thus any abnormal jarring can cause the heater to touch the cathode, creating a short. The control grid is located from three to eight thousandths of an inch (.003" to .008") from the cathode. This opening being so small is susceptible to shorts caused by foreign matter or bits of tube coating material. But, because these spaces are quite tiny, the shorts resulting are usually able to be burned off without much difficulty.

The control grid aperture determines the controlling ability of this electrode. The aperture is usually about .035" in diameter. Being so small it may become clogged with foreign matter, causing the grid to lose control This defect may be remedied by burning off the foreign matter, or actually melting some of the metal forming the aperture. This is specially effective in restoring tubes that have lost much of their emission.

Common Faults of Kinescopes

Some of the most common faults are shorts between elements, open connections to elements, weak emission, stale cathode caused by prolonged inactivity, broken cathode tab connection, and gas. All except the gassy tube are repairable, *in most cases*, by the Cathode Beamer. Gas which is caused by air leaking into the tube, results in a defect which cannot be repaired.

Gas Test

If there is any evidence that tube is gassy, such as no grid cutoff, multiple shorts, or excessive emission, a further test for gas may be made by the use of the auxiliary HIGH FREQUENCY COIL.

CAUTION: When applying the COIL, remove second anode lead from the tube. If the tube is in a set, also remove the AC cord of the set from the outlet.

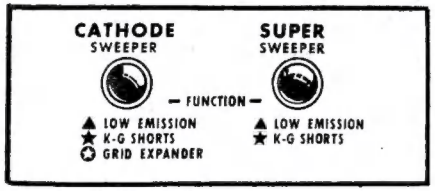
Plug the HIGH FREQUENCY COIL into a source of 110-120 VAC. Adjust vibrator at end of coil until maximum output is attained, indicated by high pitch buzzing sound from the coil. Apply the tip of the coil to any pin of the tube. Watch the electron gun. If it is surrounded by a reddish-purple cloud, then the tube contains gas. A light bluish fluorescence on the inside of the neck is harmless. This is merely a part of the face coating which adhered to the neck during manufacture. Before putting the coil down, reduce the output by turning its control counter clockwise.

REPAIRS:

Gassy tube not repairable. Replace with new tube.

How To Repair Kinescopes with Your Cathode Beamer

Restoring Emission



Set Master Selector to: SWEEPER

Do not attempt to restore emission to a shorted tube without first removing the short. Weak emission is one of the most common faults of kinescopes, and can usually be remedied by the Cathode Beamer. Weak emission may be caused by contamination of the cathode with an excess of ions, by a stale cathode which has been inactive too long, or by prolonged use which seriously reduces the flow of electrons from the cathode. To correct these conditions, procede as follows:

Be sure Ion Trap is on neck of tube to avoid damage to the tube. Note the emission reading, found during the emission test. Now, depress the button labeled CATHODE SWEEPER. Watch for a slight blue flash in the electron gun. If you see such a flash, turn the Master Selector to EMISSION and note the gain in emission. If no blue flash is observed, depress the SUPER SWEEPER button. This fires an electrostatic charge across the cathode of about five times the value obtained with the Cathode Sweeper.

If a satisfactory gain in emission is still not achieved, the K-ACTIVATOR may be used. Depress the button labeled CATHODE BOOSTER. This provides an increased heater voltage which applies more heat to the cathode. This increased heat loosens the emit-

ting material and causes the cathode to become more active. Hold the CATHODE BOOSTER button down for about 15 seconds. Note the increased glow from the heater. Release the CATHODE BOOSTER. Now, depress the SWEEPER or SUPER SWEEPER button and watch for a blue flash. Then turn the Master Selector to EMISSION and note the increase in the emission of the tube. Repeated sweeping of the cathode will result in removing the emitting material from the cathode. To prevent excessive removal check the emission after each flash is observed in the tube.

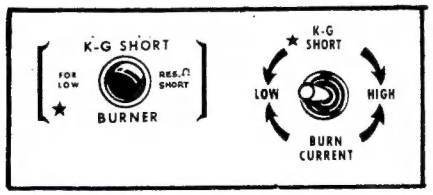
Expanding the Grid to Restore Emission — When a tube has lost a large quantity of its emitting material, or becomes stale due to prolonged inactivity, it may not respond to either the Sweeper Circuits or K-Activator procedure. Many of these tubes may be restored to useful life by expanding the grid opening, thus allowing more electrons to flow through the grid aperture. Care must be taken, however, in not expanding the grid opening too much, or it will impair the ability of the grid to cut-off the electron stream. To expand the grid procede as follows: Set Master Selector to: SWEEPER

While watching the opening in the grid, depress the CATHODE BOOSTER and CATHODE SWEEPER buttons at the same time. At the first indication that the metal in the grid aperture is melting, release the buttons. Too long a treatment will cause the tube to lose contrast or the grid to loose complete control. Then allow the tube to cool, and check for emission. If emission is improved, check the control of the grid to see that it has not gone beyond the upper limit on the GRID CONTROL potentiometer.

It may require some practice to determine just how much metal to melt. It takes only a little to get results. Removing too much will ruin the grid control. Practice on a few duds to get the feel of the correct procedure.

Aging the Reactivated Tube — To stabilize the cathode for lasting results, after emission has been restored, the cathode should be properly aged. This is best accomplished by connecting only the heater and allowing it to operate for a period of 2 to 4 hours. The Raytronic Tube Ager is a handy accessory designed just for this purpose. In the absence of a suitable tube ager, the tube may be allowed to operate in the set, immediately after reactivation for 2 to 4 hours. This however, is not ideal, since all elements are connected rather than just the heater.

REMOVING K-G SHORTS



Cathode-to-Grid shorts are usually low resistance shorts, due to the close proximity of the Cathode to the Control Grid. Being low resistance, they require higher currents for removal. To burn out a K–G short, procede as follows:

Turn Master Selector to: SHORTS

Now flip the K–G SHORT BURN CURRENT toggle switch to LOW. Then depress the K–G SHORT BURNER button located to the left of the test

Facts About Your New RAYTRONIC CATHODE BEAMER

Your Cathode Beamer was developed after extensive research into the faults of kinescopes and how they could be remedied. All methods outlined in this instruction book have been thoroughly tested by trained technicians.

WHAT IT WILL DO

Testing — The Cathode Beamer will test all TV kinescopes as well as other types of cathode ray tubes for heater condition, open elements, shorts between elements, emission, cathode contact condition, grid control, and gas. The Shorts test will also indicate the actual leakage in megohms between shorted elements.

Repairing — Unlike most CR tube checkers, your Cathode Beamer will also repair many of the common faults found in TV picture tubes and other CR tubes. It will restore emission, remove shorts, weld open cathode contacts, reactivate stale cathodes, and restore grid control in many cases. And, it will restore the brightness to many tubes which otherwise have nothing wrong.

WHAT IT WILL NOT DO

The Cathode Beamer is not a cure-all. It cannot repair burned out or shorted filaments. Neither can it remove gas from a tube or heal tiny leaks which allow air to enter the envelope. Such faults render a tube useless, or nearly so and any such tube should be replaced

What Comes with Your Cathode Beamer

In addition to the main instrument, your Cathode Beamer is supplied with a separate High Frequency Coil, a special Vibrator, and an Auxiliary tube socket adapter. The tip for the coil is packed in the small box containing the socket adapter. This tip should be plugged into the front of the High Frequency coil and pushed in as far as it will go. It is held by a friction fit.

INDEX

TO REGISTER YOUR WARRANTY, BE SURE TO MAIL IMMEDIATELY THE WARRANTY CARD YOU RECEIVED WITH THE INSTRUMENT.

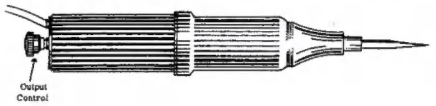
meter. If the short burns off, there will be a noticeable blue flash in the neck of the tube. Do not depress the Short Burner for more than 10 seconds at a time. If the short still remains, flip the toggle switch to HIGH and push the button again.

If the short still remains, repeat the above process, but first depress the CATHODE BOOSTER button for about 15 seconds, then release. This allows the cathode to expand.

If this fails, turn the master selector to SWEEPER. Depress first the CATHODE SWEEPER. If the short still remains, depress the SUPER SWEEPER. If necessary, depress the CATHODE BOOSTER button for fifteen seconds, release, and then depress the SUPER SWEEPER button.

If all these methods fail, the short can assumed to be welded in place, and any further increase in current would only burn out the lead wires.

Removing Other Inter-Element Shorts

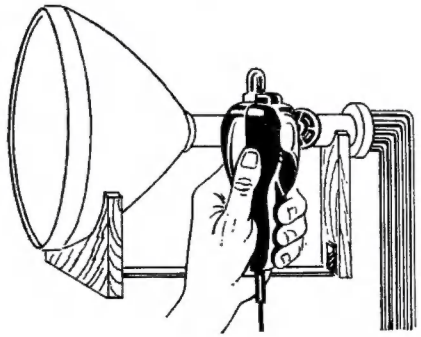


To remove inter-element shorts first determine which elements are shorted. Next prepare a short test lead with an alligator clip on each end. Attach one clip to one of the shorted element pins, and the other clip to a suitable ground such as the TV chassis or a large piece of metal.

Remove the Cathode Beamer and TV set AC plugs from the 110-volt line.

Plug the HIGH FREQUENCY COIL into the line. Adjust vibrator in end of coil for maximum output as indicated by the highest pitch buzzing sound. Apply the tip of the Coil to the pin of the second electrode involved in the short (not the one to which you attached the test lead). This will cause a high-voltage charge to flow from one shorted element, through the short, to the other element, out through the test lead to ground. This should burn out the short. Before putting the Coil down, reduce its output by turning the Vibrator Control counter clockwise.

Welding the Cathode Tab



When the weld breaks between the Cathode and its connecting tab, it is often possible to re-weld the joint with the Cathode Beamer. The tube must be removed from the set and placed upon the workbench. As a safety measure, goggles should be worn during the repair procedure.

The process of welding an open cathode tab consists of vibrating the neck of the tube to cause the open ends of the break to touch each other momentarily. At the same time an instantaneous pulse of about 20 amperes of weld current is applied. To become proficient at this procedure it is best to practice on some old duds.

Place the picture tube so that the neck is in a horizontal position as

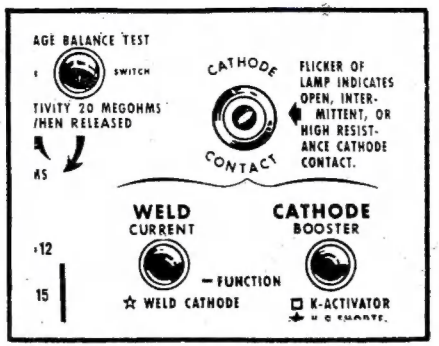
shown, and rotate the tube so that the cathode lead wire is on top.

Set the Master Selector Switch to: CATHODE

Plug the VIBRATOR into a source of 110-VAC and turn on the vibrator switch.

Apply the plastic tip of the vibrator to the neck of the tube, gently at first, applying more pressure gradually, if necessary. The neon lamp marked CATHODE CONTACT should be flickering.

Now, while the vibrator is being applied and the CATHODE CONTACT lamp is flickering depress the WELD CURRENT button not more than 10 seconds. If the weld takes, the lamp should glow without flickering. Remove



the vibrator and tap the neck of the tube with the non-metallic handle of a screwdriver. If the weld is solid the lamp will not flicker.

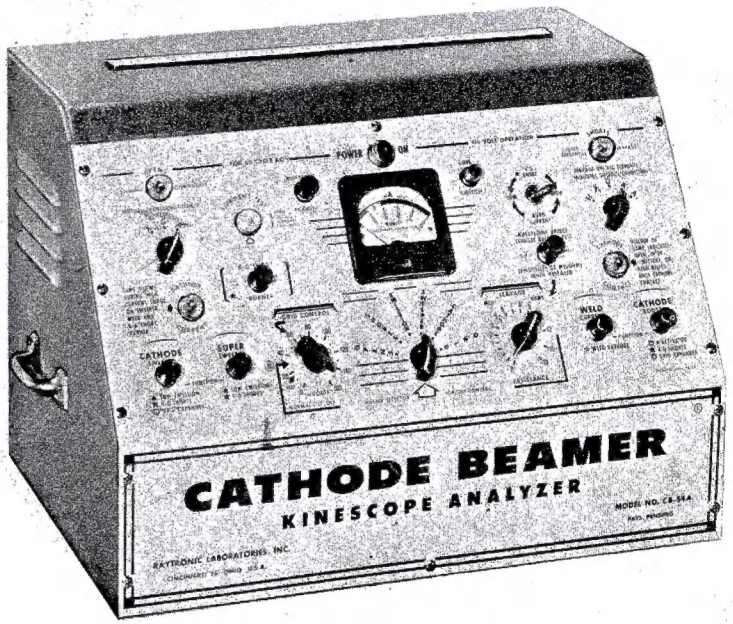
If the weld does not take, rotate the tube 180 degrees so that the cathode lead wire is on the bottom, and repeat the above procedure.

Warranty

Your Cathode Beamer Kinescope Analyzer is made of the finest material, and carefully tested at the factory before shipment. It carries the standard RETMA warranty against defects in material or workmanship for a period of 90 days from date of purchase. Should any defect be discovered within this warranty period, return the unit to the distributor from which it was purchased.

Raytronic Laboratories, Inc.
Cincinnati, 15, Ohio

How To Use Your RAYTRONIC Cathode Beamer Kinescope Analyzer



To Make It Pay For Itself

IMPORTANT Your Cathode Beamer is a precision instrument which will produce real profits for you, if used correctly. Before using it, read this book thoroughly in order to become familiar with the instrument. Then keep the book handy for ready reference. Like any precision electrical device, your Cathode Beamer should be protected from moisture.